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fall very slowly in the air. Theoretically, a small spherical body should fall at the same rate as a large spherical body of the same composition; but it does not, and this may easily be demonstrated by throwing a shovelful of coal composed of pellets of various sizes—some as fine as dust—into the air at a height of even six or eight feet. The very finest dust floats for some time in the air, and the largest pellets reach the ground first. It is indeed due to this surface attraction that small bodies like pollen grains, fungus spores and the like, are capable of being transported through the air over such great distances.

J. B. DANDENO.

AGRICULTURAL COLLEGE, MICHIGAN,

April 3, 1905.

#### THE WEIGHT OF THE BRONTOSAURUS.

AT the request of Professor H. F. Osborn the writer undertook to make an estimate of the probable weight in the flesh of a *Brontosaurus excelsus*. The mounted skeleton in the American Museum is 66 feet 7 inches long, and from this a very carefully studied model or restoration was made by Mr. Charles R. Knight, who also made use of Dr. W. D. Matthew's studies upon the probable size and arrangement of the muscles in this animal. The skeleton was mounted after the prolonged study and discussion of a number of specialists; its contours are strikingly lifelike, and Mr. Knight's long training well qualified him to infer the external contours of an animal from its internal framework. Hence the model should correspond fairly well with the animal itself.

From the model, a number of plaster casts were made, and one of these was used in the following determination. The model was constructed as nearly as possible to the exact scale of one sixteenth natural size, hence the cubic contents of the model multiplied by the cube of 16 (4096) should indicate the probable volume of water which would be displaced by the animal in the flesh. One of the casts was cut into six pieces of convenient size, which were then made water-tight by a double coating of shellac. Professor William Hallock very kindly consented to determine accurately

the cubic contents of these pieces in one of the physical laboratories at Columbia University.

The weight of the cast in air minus its weight in water would equal the weight of an equal volume of water. This differential weight was determined in grams. As a gram is the weight of a cubic centimeter of water the weight of the water displaced gave directly the cubic contents of the model. Professor Hallock found the weight of the water displaced to be 7,595 grams (about .27 cubic feet), or say 7.6 kilograms. Hence the animal itself would displace  $7,595 \times (16)^3 = 31,129,600$  c.c. or 31.13 metric tons. Converting this into tons, we have  $31.13 \times 2,200 \div 2,000 = 32.24$ , or say  $34\frac{1}{4}$  tons, as the estimated weight of the water displaced by the animal. But as the animal was probably slightly heavier than the water displaced, in order to enable it to walk on the bottom along the shore of lakes and rivers, we may add about ten per cent. to  $34\frac{1}{4}$  tons, securing as a final estimate 38 tons.

This result accords very well with Mr. F. A. Lucas's careful estimate of the weight of a 75-foot sulphur bottom whale, an animal of much greater bulk than the *Brontosaurus*. This weighed about 63 tons, and in conversation with the writer Mr. Lucas expressed the opinion that the *Brontosaurus* did not weigh 'much more than half as much.' This opinion seems justified by the estimate given above.

W. K. GREGORY.

AMERICAN MUSEUM OF NATURAL HISTORY,

NEW YORK,

September 30, 1905.

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#### QUOTATIONS.

COLLEGE ADMINISTRATION.

OF the several conferences of the installation week at Champaign-Urbana, the one announced as a conference of trustees to consider methods of administration builded larger and possibly better than it knew. It included not alone the problems of the conduct of the business machinery of these great corporations, but raised the fundamental issues in regard to *raison d'être* of boards and presidents, and administrative means and measures. And it raised the most pertinent query as to the